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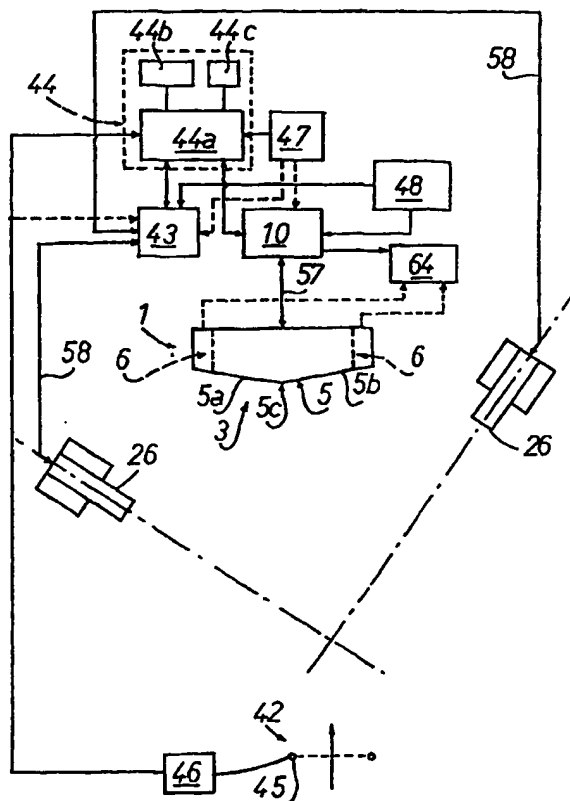
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(54) Title: EXERCISING APPARATUS FOR DEVELOPING THE SHOOTING SKILLS OF ICE HOCKEY PLAYERS

## (57) Abstract

The invention relates to an exercising device for developing the shooting skills of ice hockey players. The invention comprises a goal structure (1). In the front section (3) of the goal structure and in the goal aperture, there is installed a closing plate (5), which is provided with at least one goal target (6) being smaller in size in comparison with the goal aperture (4). According to the invention, the goal target (6) of the goal structure is provided with a hatch and a shifting means, such as a pneumatic cylinder, for opening and closing the hatch. The shifting means is connected to a control device (10). The goal target (6) is provided with a detector for detecting pucks that hit an open goal target. The detector is connected to a recording device (10) and/or to a signalling device (64). The apparatus includes one or more passing devices (26) for passing the puck to the player in order to be shot towards the goal structure (1) and the goal target (6). The passing device (26) comprises a control device (43) for controlling the operation of the passing device. The exercising apparatus is provided with a player gate (42) for detecting the approach of a player. The player gate (42) is connected to the passing device (26) and to the control device (43). Thus, the passing device (26) is automatically started to pass the puck to the player. The exercising apparatus also comprises a central control unit (44) and/or a manual control unit (47) whereby the goal structure (1) and other connected devices (26, 42) are controlled and supervised.



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EXERCISING APPARATUS FOR DEVELOPING THE SHOOTING SKILLS OF ICE HOCKEY PLAYERS

5 The invention relates to an exercising apparatus defined in the introductory portion of patent claim 1 for developing the shooting skills of ice hockey players. In addition to ice hockey, the exercising apparatus can also be applied to other similar two-team games, where the aim is to shoot a piece, such as a ball or a puck, by the player of one team to the goal of the other, opposing team.

In the prior art there is known, from the US patent 4,607,842, an exercising apparatus for practicing the shooting skills of ice hockey players. The apparatus comprises a lane and a goal structure fixed at the end of the lane. In each corner of the goal structure, there is installed a goal target and a connected lamp. Moreover, the apparatus includes a puck dispensing device arranged at the other end of the lane, which device feeds pucks one by one to in front of the player on a belt conveyor. Beside the belt conveyor, there is provided a platform for the player, where he stands and shoots pucks towards a given target of the goal structure. The exercising apparatus also includes a control circuit for operating the lamps associated to the shooting targets to turn on and off, for visually indicating to the player to which target he must try to aim at. The lamps are operated at the same speed as the pucks are dispensed for the player.

30 From the US patent 3,709,489 there is known an ice hockey skill testing and practicing apparatus comprising among others a target means with a wall provided in the frame thereof; the corners of the wall are provided with apertures whereto the player should shoot the puck in a testing or practicing situation. A corresponding practicing apparatus is introduced in the Swedish patent application SE 8,701,314-0.

A drawback in the prior art devices is that with them, there cannot be created a genuine play-like situation where practicing gives the best possible result. A play-like situation here means a scoring situation in a match, where a space momentarily opens for a player past the goalie; now the puck should be shot quickly and accurately to this space in order to score a goal before the goalie has time to block the space. Moreover, the known practicing systems do not include a puck passing device or, if they do, this device does not serve a practicing pass that should correspond to the pass served by another player in a game.

The object of the present invention is to introduce a new and improved exercising apparatus for developing the shooting skills of ice hockey players, by means of which the above mentioned drawbacks can be eliminated. In order to realize this, the apparatus of the invention is characterized by the novel features enlisted in the characterizing portion of patent claim 1.

The most important advantage of the invention is that the practicing situation for the player resembles a genuine game when he uses the exercising apparatus of the invention. This makes practicing both interesting and effective. The practicing situation resembles a real game because the target holes of the goal structure open and close at random in an unexpected order during the exercise, so that the player must react quickly when shooting the puck; moreover, any of the holes of the goal structure can open, which means that the shot must be aimed accurately in order to hit the target hole. Another advantage of the invention is that the passing device of the exercising apparatus also offers possibilities for practicing puck reception and particularly scoring directly from a pass. Yet another advantage is that the exercising apparatus is easily transportable, which makes it simple and quick to put into use.

In the specification below, the invention is explained with reference to the appended drawings, where

- figure 1 is a schematical overall view of the exercising apparatus, seen from the top;  
figure 2 is a front-view illustration of the goal structure;  
figure 3 is a cross-section A-A of the goal structure of figure 2;  
figure 4 is a front-view illustration of a goal target, when the blocking plate is removed;  
figure 5 is a cross-section B-B of the goal target of figure 3;  
figure 6 is a schematical illustration of the power circuit of the detector of the goal target;  
figure 7 is a schematical and partly cross-sectioned illustration of the puck passing device;  
figure 8 illustrates the detail C of the passing device of figure 7; and  
figure 9 is a schematical illustration of the player gate.

The exercising apparatus according to the invention for developing the shooting skills of ice hockey players is illustrated in figure 1. This exercising apparatus comprises a goal structure 1, a goal control device 10, a passing device 26, a pass control device 43, a player gate 42 and a gate unit 46. In this embodiment, the control devices 10, 43 and the gate unit 46 are connected to a central control unit 44. In this embodiment, the exercising apparatus also includes a manual control unit 47, whereby the control of the goal structure 1 and the passing device 26 can be realized either past the central control unit 44 or by means thereof. Advantageously the goal structure 1 and the passing device 26 comprise pneumatic power means and their control valves, as well as electric actuators of these. In order to operate the pneumatic power means, the exercising apparatus is provided with a compressed air source 48, such as a compressor. The goal structure 1 and the passing device 26 are connected by means of pneumatic/-electric wires 57, 58 to the control devices 10, 43 thereof.

The goal structure 1 comprises a goal frame 2, as is seen in figure 3. In its measures, the essentially vertical,

rectangular front piece 3 of the goal frame 2 corresponds to a goal according to the rules of the ice hockey game (figures 1 and 2). Thus it encloses the goal aperture 4 proper. In the front piece 3 of the goal frame, there is installed a blocking plate 5 or a similar member, which essentially covers the goal aperture 4.

The blocking plate 5 is advantageously made of two plate elements 5a, 5b arranged at a slight angle to each other, and the vertical joint 5c in between these two is essentially located in the middle of the front piece 3 of the goal frame 2. Thus the surface of the blocking plate 5 is always slightly askew, when seen directly from the front. The advantage of this arrangement is that such pucks that are shot towards the goal structure but do not hit the goal target, generally hit the blocking plate 5 and bounce to a direction other than that where they came from, and consequently do not disturb the exercise by remaining in front of the goal structure.

The blocking plate 5 is provided with four goal targets 6; 6a, 6b, 6c, 6d. They are located in the corners of the blocking plate 5 and thus in the corners of the front piece 3 of the goal frame 2. In this case, the goal targets 6 are rectangular in shape, and their size is clearly smaller than the goal aperture 4 proper. The height and width of the goal target 6 are for instance 10 - 20 % of the respective measures of the goal aperture. When practicing, the player tries to shoot the puck to the goal target 6.

Each goal target 6 of the goal structure 1 comprises a closing member, such as a hatch 7; 7a, 7b, 7c, 7d, an actuator, such as a pneumatic cylinder 8; 8a, 8b, 8c, 8d in order to open and close the hatch 7; 7a, 7b, 7c, 7d or the like, and a goal space 9; 9a, 9b, 9c, 9d located behind the closed hatch (figures 2 and 3). When opening, the hatch 7; 7a, 7b, 7c, 7d can be shifted momentarily off the goal space 9; 9a, 9b, 9c, 9d by means of the pneumatic cylinder 8; 8a, 8b, 8c, 8d in order to indicate an active goal target, i.e. a shooting target for the

player, and respectively, when closing the hatch it is shifted to in front of the goal space 9 in order to block it, in order to indicate a passive goal target and to obliterate the shooting target. The pneumatic cylinder 8; 8a, 8b, 8c, 8d of each hatch 7; 7a, 7b, 7c, 7d is connected to the control device 10 in order to realize the shifting operations of the hatch.

The goal target 6 of the goal structure is provided with a hatch, as was mentioned above. The hatch 7 is arranged in connection with the inlet 66 of the goal target 6, for instance in the blocking plate 5 and in the front piece 3 of the goal frame, or in the vicinity thereof (figures 3 and 4). The hatch 7 is arranged to be movable back and forth, in between two guide rails 11, 12 installed in the front piece 3 of the goal frame. The said guide rails 11, 12 are advantageously bars of U-profile and are installed so that the grooves 11a, 12a open against each other. The hatch 7 is arranged in between the guide rails 11, 12, in the grooves 11a, 12a thereof, where the hatch 7 can now be moved back and forth. The edge of the hatch 7 is provided with a catch 13, whereto the piston rod 14a of the pneumatic cylinder 8 is connected. The frame 14b of the cylinder 8 is attached to the goal frame 2, advantageously to a support member 65 arranged in between the guide rails 11, 12. Now the pneumatic cylinder 8 is located at the side of the goal space 9, protected behind the blocking plate 5 (cf. figure 2) and so that its lengthwise axis is essentially parallel to the surface of the blocking plate 5 and the hatch 7. The inlet 66 of the goal target 6 is opened by shifting the hatch 7 by means of the pneumatic cylinder 8 along the guide rails 11, 12 off the inlet 66 to behind the blocking plate 5, and respectively the inlet 66 is closed by shifting the hatch 7 to the inlet 66 of the goal target 6.

In this case the pneumatic cylinder 8 is a double-acting cylinder operated by means of a control valve 15a, such as a three-way valve, and the electric actuator 15c thereof. The inlet 66 of the goal target 6 is closed by pushing the piston rod 14a of the cylinder 8 out of the cylinder space to the

first operative position (figure 4), so that the hatch 7 moves along the guide rails 11, 12 to the inlet 66. The cylinder 8 is moved to the first operative position by opening the compressed air duct 16a from the pneumatic wire 16 by means of and through the control valve 15a to the first section 14d of the cylinder space, with respect to the piston 14c. The inlet 66 of the goal target 6 is opened by pulling the piston rod 14a of the cylinder 8 in from the cylinder space to the second operative position, in which case the hatch 7 moves along the guide rails 11, 12 away from the inlet 66. The piston rod 14a of the cylinder is shifted to the second operative position by means of the control valve 15a through the compressed air duct 16b, by means of compressed air fed into the second section 14e of the cylinder space, with respect to the piston 14c, from the pneumatic wire 16 via the compressed air duct 16b. At the same time as the feeding of the compressed air through the control valve 15a is started to one section 14e; 14d of the cylinder space, the feeding thereof to the second section is interrupted, and the pressure of the second section 14d; 14e is let off into the surroundings.

The control device 10 comprises control valves 15a and the actuators 15b thereof for conducting compressed air into the pneumatic cylinders 8; 8a, 8b, 8c, 8d via the pneumatic wires 16; 57 from a suitable compressed air source, such as a compressor 48 (figure 1). In addition to this, the control device 10 includes an electric control unit for controlling the actuators 15b of the valves by means of electric messages intermitted via wires 57a, either independently, in a desired order and at regular intervals, or by external control. Thus the control device 10 can be an independent device, but it can also be connected to the common central control unit 44 (figure 1).

The goal space 9 is advantageously provided with means for preventing the pucks that have hit the goal target 6 from bouncing back to in front of the goal structure 1, to the exercise area (figure 3). Those goal targets 6a, 6b that are



arranged in the top part of the goal aperture 4 and the blocking plate 5 and are generally located above the floor surface of the exercise space, are provided with a inclined surface 23, which is inclined backwardly and downwardly from the inlet 7a, 7b of the goal space, so that at the inlet of the goal space, there is formed a threshold-like obstacle 24 which prevents the puck from returning to the rink. As for those goal targets 6c, 6d that are arranged in the bottom part of the goal aperture 4 and the blocking plate 5, are provided with an obstacle 25 or a threshold, which prevents the puck from bouncing back to the rink.

In connection with each goal target 6, there is advantageously arranged a detector for detecting the pucks that hit the goal target. The detector 17 is installed in the goal target 6, in the goal space 9 provided behind the hatch 7, which also serves as the puck collecting space, as is seen in figure 3. The detector 17 comprises a plate 18 which is fixed turnably at its top edge 18a to the top part of the goal space 9, at a distance from the hatch 7, so that the hatch 7 can freely open towards the inside when opened by the cylinder 8. At the top edge 18a of the plate, there is now arranged for instance a uniform axis, or pins 49a, 49b provided on the same axis and inserted in holes 52, 53 or corresponding bearing points arranged in the opposite walls 50, 51, as is seen in figure 5. The electric conductor 19 and the plate 20 connected thereto are installed in the plate 18, advantageously at the rear surface thereof. At a small distance from the plate 18, behind it when seen from the front of the goal structure 1, there is arranged a conducting counterpiece 21. The counterpiece 21 is for instance a small conducting plate, which also is fixed to the top part of the goal space 9, and whereto an electric conductor 22 is connected. The small plate 20 and the counterpiece 21 now form a switch 55 in the circuit 56 (figure 6). This switch 55 is closed, i.e. the plate 20 and the counterpiece 21 meet, when the plate 18 is turned backwards after being hit by the puck, and opened, when the plate 18 swings back and the motion is attenuated to the starting position. When the switch 55 is

closed, the circuit 58 is switched on, and the electric impulse and the hit are recorded in a recording device, for example in the control device 10, and/or detected with the signalling device 64.

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The detector 17 can also be realized so that the plate 18 is formed of some electroconductive material, such as metal. Now the plate 18 in itself serves as one pole of the switch 55, which pole is connected by a conductor to the control device 10. Instead of the switch 55, in the circuit 56 there can also be used some other type of electric switch reacting to the turning of the plate 18.

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In the above description, the detector 17 is connected to the control device 10, but it can also be connected to a simple electric recording device, such as a calculator or the like. Through a suitable control device, the detector can also be connected to a lamp, a signal horn or other similar signalling device 64. When the puck hits the goal target, this is indicated by a flash of light, a tooting of the horn or the like.

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In figure 1, the exercising apparatus of the invention comprises a passing device 26 for passing the puck for the player in order to be shot towards the goal structure 1 and the goal target 6. In figure 7, the passing device 26 comprises a vertical storage silo 27 for the pucks, a puck shifting device 28, a feed channel 29, and means provided in connection with the latter for hurling the puck through the feed channel 29 for the player, to in front of the goal structure 1, at a suitable distance therefrom, in order to be shot into the goal.

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The puck hurling means include a release arm 30, a spring 31, a pneumatic cocking cylinder 32 and a trigger 33. The release arm 30 is turnably attached at the point 34a to the frame 34 of the passing device, so that it forms two lever arms 30a, 30b. At its free end, the first lever arm 30a is connected to the frame 34 by the spring 31. The second lever arm 30b forms the puck hurling arm proper, which operates in an opposite

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direction with respect to the position of the spring 31 and the effective spring power thereof. The spring 31 is cocked, and simultaneously the second lever arm 30b is set in a stand-by position for shooting (figure 7) by means of the cocking cylinder 32; the cylinder 32 is set into operation, so that the piston rod 32a thereof pushes the second lever arm 30b at the point of support 35, until it has reached release position, i.e. the tip of the lever arm 30b is in the vicinity of the feed silo 27, so that by using the puck shifting device 28 comprising the pneumatic cylinder 28a and the pusher 28b arranged in the piston rod thereof, the puck can be shifted to in front of the tip of the lever arm 30b, into the feed channel 29. The lever arm 30a and the release arm 30 are locked in this position by means of the trigger 33. When the puck K has been pushed, by means of the shifting device 28, from the bottom part of the feed silo 27 to within the reach of the release arm 30 into the feed channel 29, the release arm 30 is released by using the trigger 33, so that the puck is hurled when the spring power of the spring 31 suddenly turns the release arm 30, with the fastening point 34a as the point of support.

The detail C of the trigger 33 in figure 7 is shown enlarged in figure 8. The trigger 33 comprises a pneumatic trigger cylinder 36 and a lock catch 37. The lock catch 37 is manipulated by moving the piston rod 33a of the trigger cylinder 33. The catch 37 is formed of jaws 38, the halves 38a, 38b whereof are turnably fastened to the frame 34 at the points of support 39a, 39b. In between the jaws 38, there is arranged a spring 40 to press the halves 38a, 38b together when the trigger cylinder 33 is not used for manipulating the opposite ends of the jaws. The release arm 30 is provided with a clamp 41, which the jaws 38 grip by means of the spring 40 when the release arm 30 is turned by the cocking cylinder 32 to hurling position (figure 7). The piston rod 33a of the trigger cylinder 36 is provided with a runner 33b which is pressed against those free ends 38c, 38d of the catch 37 that are opposite the jaws 38, so that they (38c, 38d) are pressed together, and the clamp 41 is released from the hold of the jaws 38a, 38b held by the

spring 40. Now the release arm 30 also is released, and the passing device 26 is in operation.

5 The passing device comprises a control device 43 for controlling the operation of the passing device, particularly the cylinders 28a, 32, 36 thereof (figures 1 and 7). The control device 43 comprises control valves 67, 68, 69 and their actuators 70, 71, 72 for conducting compressed air into the pneumatic cylinders 28a, 32, 36 via the wires 58 from a  
10 suitable compressed air source 48. Advantageously the pneumatic cylinders 28a, 32, 36 are double-action cylinders, such as the cylinders 8 of the goal targets 6, and similar control devices and actuators are used in connection thereto (cf. figure 4). Moreover, the control device 43 includes an electric control  
15 unit for controlling the actuators, either independently at regularly set intervals, or by means of external manipulation. Thus the control device 43 can be an independent device, but it may also be connected to a common central control unit 44.

20 The exercising apparatus in figure 1 includes a player gate 42, wherethrough the player approaches the goal structure 1 when practicing shots. The player gate 42 comprises a player detector 45 and an electric gate unit 46 where to the detector 45 is connected. The player gate 42 is connected, via its gate  
25 unit 46, to the control device 43 of the passing device 26 (either directly or through the central control unit 44). When it is detected, at the player gate 42, that the player is approaching in order to perform the exercise, the gate 42 sends a message to the control device 43. As a result, the  
30 passing device 26 is directed to hurl a puck suitably to a predetermined direction for the player when he approaches the goal structure 1.

35 The detector 45 of the player gate 42 is realized for instance optoelectrically by using a photocell. A combined light transmitter/receiver 59 is arranged on a first pedestal 60, and a mirror device 61 is arranged on another pedestal 62. The transmitter/receiver 59 and the mirror device 61 are adjusted

at a suitable distance from each other, so that the light beam from the transmitter passes to the mirror device 61 and is reflected threfrom back to the transmitter/receiver 59. When the player passes through the light beam thus obstructing it, this is detected in the gate unit 46 connected to the transmitter/receiver 59, and as a result a message is sent to the control device 43 that the player is on his way.

The player gate 42 can also be realized as a mechanical gate arrangement, where a bar is turned as the player passes through the gate, and simultaneously a detector 45 connected to the bar and realized by using an electric switch sends a message via the gate unit 46 to the control device 43 in order to start the operation of the passing device 26.

The gate unit 46 of the player gate 42 comprises an amplifier for amplifying the electric message given by the detector 45 and possibly a message decoder for decoding the message into a suitable form for the control device 43 of the passing device 26 and for the central control unit 44, for instance.

The control device 10 of the goal structure 1 and the control device 43 of the passing device 26 are advantageously connected to the central control unit 44. The central control unit 44 is realized for example by using programmable logics or a computer 44a and connected equipment, such as a keyboard 44b and a display screen 44c (figure 1). The timing of the hatches 7 of the goal targets of the goal structure 1 and the passing operations of the passing device 26 is advantageously realized so that they are triggered off by the start-up message sent from the player gate.

Advantageously the central control unit 44 also comprises a manual control unit 47, whereby the goal structure 1 and/or the passing device 26 can be controlled manually by the supervisor of the exercise.

In principle the exercising apparatus of figure 1 is operated as follows. In order to perform the exercise, the player skates to the rink through the player gate 42. The detector 45 of the player gate 42 sends a message of the player's approach to the central control unit 44 via the gate unit 46. The central control unit 44 further sends a message to the control device 10 of the goal structure 1 and to the control device 43 of the passing device 26. The control device 10 of the goal structure 1 sets the cylinders 8 in operation in a predetermined fashion, so that the hatches 7 of the goal targets 6 are opened and closed in a desired order or at random, and the goal targets 7 are in active state, i.e. the hatches 7 remain open for a predetermined period of time.

As for the control device 43 of the passing device 26, it sets the passing device 26 in operation, so that after a predetermined time has passed since the player entered through the player gate 42, the puck is passed for the player in the fashion described above. As an alternative, the passing device 26 can be arranged to be operated manually from the manual control unit 47.

The passing device 26 can be located in the exercise area in places of free choice. The passing direction for the puck can be set to be suitable by adjusting the feed channel 29 of the passing device 26 in a desired direction. It is pointed out that the exercising apparatus can include more than one passing device 26, as is illustrated in figure 1. These can then be controlled from the central control unit 44 in a desired order, so that the player, in addition to efficient and accurate shots, also must practice the reception of passes from several different directions.

When a pass is directed to the player from the passing device 26, he tries to shoot the puck with his stick to an active goal target 6; 6a, 6b, 6c, 6d. There may simultaneously be one or several active goal targets 6 in the goal structure 1. When the puck, shot by the player, hits an active goal target 6, it

enters the goal space and hits the detector 17, with above described results. Now the detector 17 sends an electric message which is recorded in the control device 10 or other recording unit, for instance the central control unit 44.

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It is pointed out that the actuator of the hatch 7 of the goal target 6 can be other than a pneumatic cylinder 8 - for example an electric motor or other electric turning device. Respectively the pneumatic cylinders 28, 32, 36 of the passing device 26 can be replaced by other suitable actuators, for example electric ones. However, pneumatic actuators are the most advantageous because the operating conditions are very demanding, and security factors must also be taken into account.

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The goal structure 1 may include a number of replaceable blocking plates 5. Different blocking plates have different numbers of goal targets 6 and/or the location of the goal targets 6 there is different. The goal targets 6 can be realized as modular elements, which are connected to apertures suitably provided in connection with the blocking plate 5.

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In the above specification, the invention is explained mainly with reference to one preferred embodiment only, but it is obvious that many modifications are possible within the scope of the inventional idea defined in the appended patent claims.

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## PATENT CLAIMS

1. An exercising apparatus for developing the shooting skills of ice hockey players, the said apparatus comprising a goal structure (1) provided with a goal frame (2), the front piece (3) of the said goal structure (2) enclosing the goal aperture (4) proper of the game; a blocking plate (5) or the like arranged in the front piece (3) of the goal frame, which blocking plate (5) essentially covers the goal aperture (4), the said blocking plate (5) being provided with at least one goal target (6; 6a, 6b, 6c, 6d) with a goal space (9; 9a, 9b, 9c, 9d) which goal target is fairly small in size in comparison with the goal aperture (4), and which goal target (6; 6a, 6b, 6c, 6d) is provided with a closing member, such as a hatch (7; 7a, 7b, 7c, 7d), for opening and closing the goal space, to which open goal target the player must shoot his puck, characterized in that
- the closing member such as the hatch (7; 7a, 7b, 7c, 7d) is arranged to be moved along guide rails (11, 12) to in front of the goal space (9; 9a, 9b, 9c, 9d) in order to cover the space when closing the hatch and, respectively, away to reveal the goal space (9; 9a, 9b, 9c, 9d);
  - the goal target (6; 6a, 6b, 6c, 6d) is provided with a shifting device, such as a pneumatic cylinder (8; 8a, 8b, 8c, 8d) in order to open and close the hatch (7; 7a, 7b, 7c, 7d);
- and
- the the shifting device is connected to the control device (10) for controlling the shifting operations of the hatch (7; 7a, 7b, 7c, 7d), so that the goal spaces (9; 9a, 9b, 9c, 9d) of the goal targets (6; 6a, 6b, 6c, 6d) are opened and closed at random in an unexpected order from the ice hockey player's point of view for indicating a shooting target during the exercise.
2. An apparatus according to claim 1, characterized in that the goal target (6; 6a, 6b, 6c, 6d) is provided with a detector (17) in order to detect the pucks that hit it.



3. An apparatus according to claim 2, **characterized** in that the detector (17) comprises a plate (18) that is turnably suspended at its top edge (18a) from the goal target (6; 6a, 6c), and that behind the plate (18) there is provided a counterpiece (21), both the plate (18) and the counterpiece (21) being arranged to be at least partly electroconductive, so that when the plate (18) turns backwards with respect to the inlet of the goal target (6; 6a, 6c) and to the hatch (7; 7a, 7c) after being hit by a shot, the plate (18) touches the counterpiece (21) and thus connects the circuit (56) conducted therethrough.

4. An apparatus according to claim 2 or 3, **characterized** in that the detector (17) is connected to a recording device (10) and/or to a signalling device (64).

5. An apparatus according to any of the preceding claims, **characterized** in that the apparatus comprises a passing device (26) for passing the puck to the player in order to be shot towards the goal structure (1) and the goal target (6; 6a, 6b, 6c, 6d).

6. An apparatus according to claim 5, **characterized** in that the passing device (26) comprises a puck storage silo (27), a puck shifting device (28) for shifting the pucks from the storage silo (27), a feed channel (29) and means (30, 31, 32, 33) provided in connection thereto for hurling the puck out of the passing device through the feed channel (29).

7. An apparatus according to claim 5 or 6, **characterized** in that the passing device (26) includes a control device (43) for controlling the operation of the passing device.

8. An apparatus according to any of the preceding claims 5-7, **characterized** in that the exercising apparatus comprises a player gate (42) or the like, whereby the approaching of the player towards the goal structure (1) is detected, the said player gate (42) being connected to the passing device (26),

particularly to the control device (43) thereof, which gives an impulse for the passing device (26) to pass the puck to the player.

- 5 9. An apparatus according to any of the preceding claims,  
characterized in that the exercising apparatus comprises a  
central control unit (44) and/or a manual control unit (47),  
by means of which central control unit (44) and/or manual  
control unit (47) the goal structure (1) and other possible  
10 connected devices (26, 42) are controlled and supervised.

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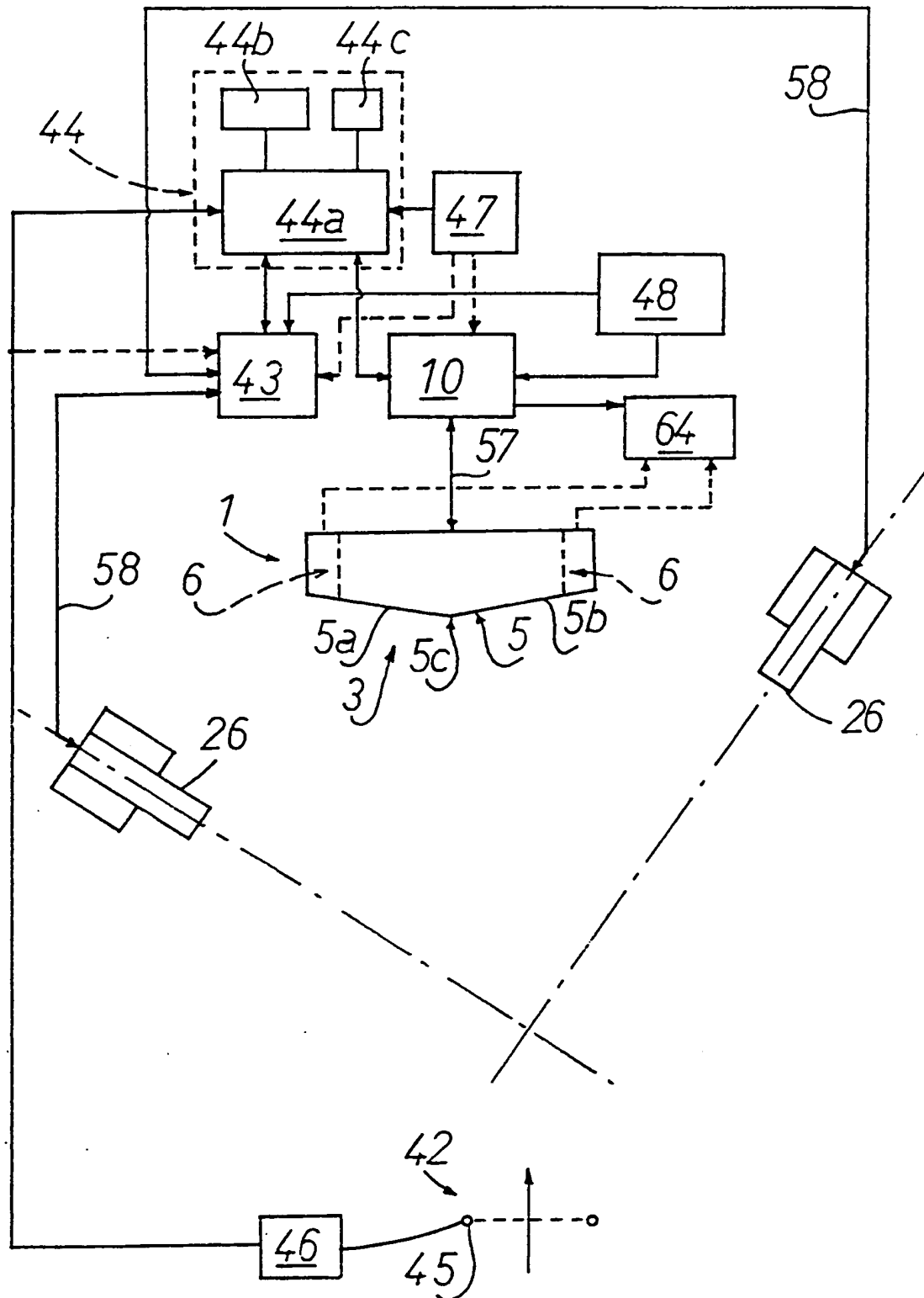
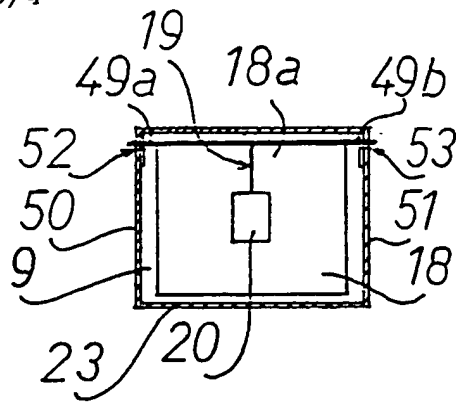


FIG.1



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FIG. 5



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FIG. 6

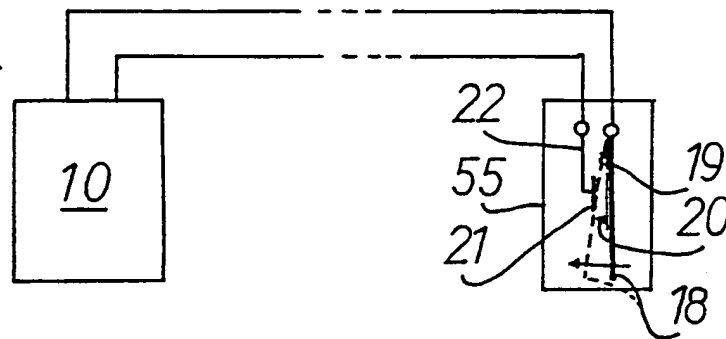
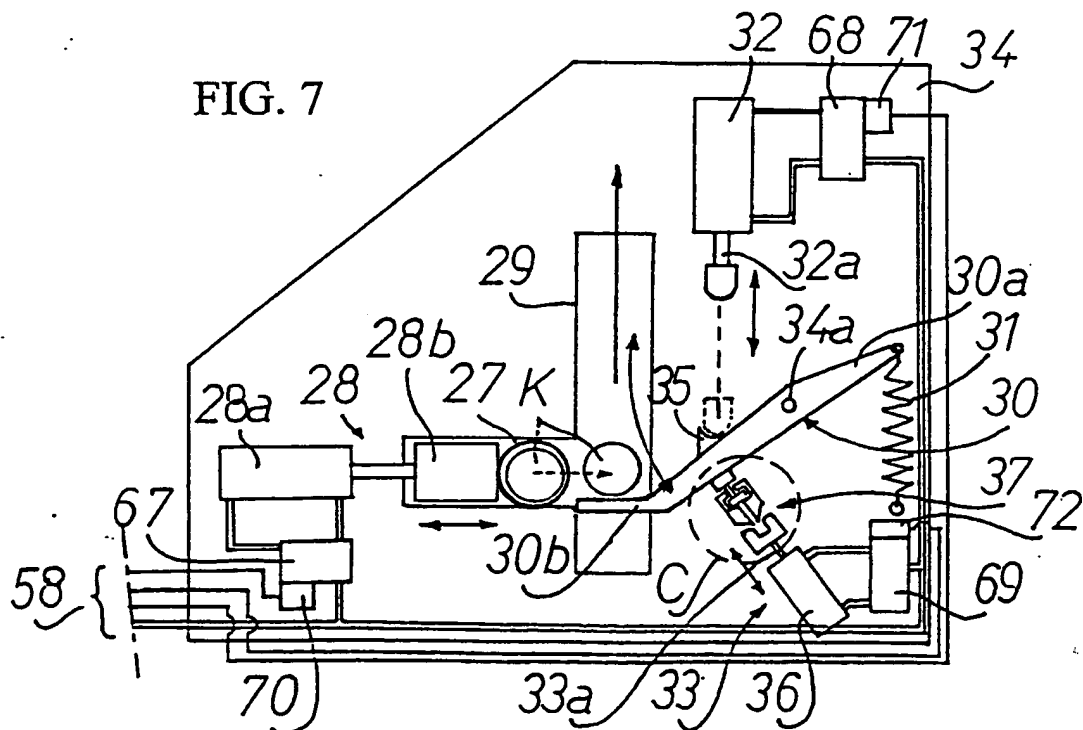


FIG. 7



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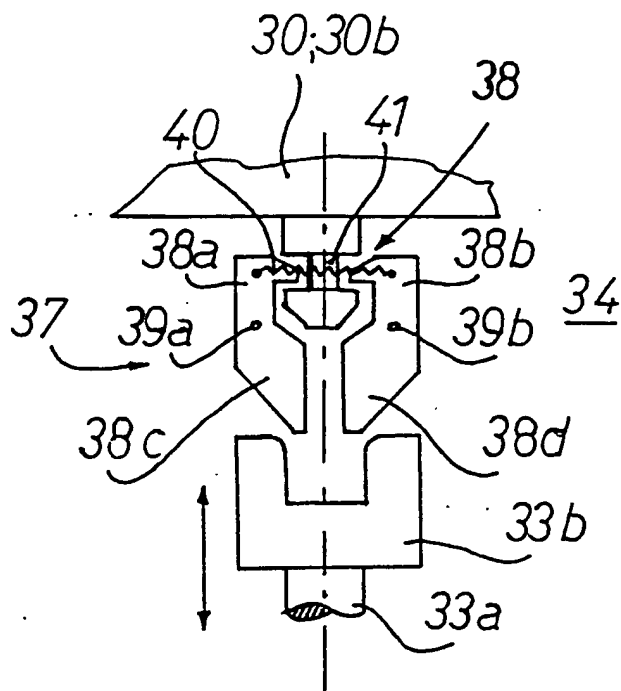


FIG. 8

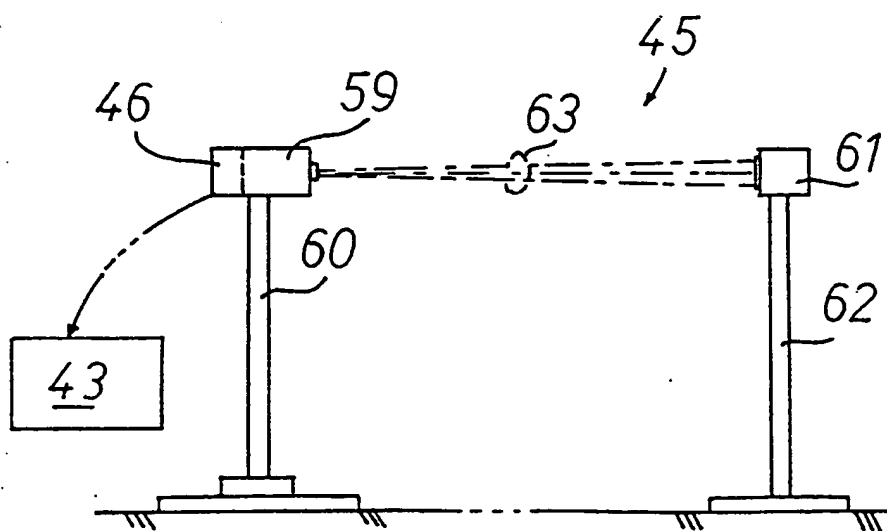


FIG. 9

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 95/00033

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A63B 69/00, A63B 63/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4607842 (R. DAOUST), 26 August 1986 (26.08.86) --	1-9
A	DE, A1, 3503549 (HORVATH, V.), 7 August 1986 (07.08.86) --	1-9
A	US, A, 3887181 (J. SAMARAS), 3 June 1975 (03.06.75) -- -----	1-9



Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search

9 June 1995

Date of mailing of the international search report

15 -06- 1995

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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

03/05/95

International application No.

PCT/FI 95/00033

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US-A-	4607842	26/08/86	NONE	
DE-A1-	3503549	07/08/86	NONE	
US-A-	3887181	03/06/75	NONE	



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